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INSPIRING INNOVATIONS

FLM BK PB M12 DI 8 M12

Fieldline Modular Bus Coupler for PROFIBUS With 8 Digital Inputs

PROFI PROCESS FIELD BUS BUS

AUTOMATIONWORX

Data Sheet

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Description

The device connects a Fieldline modular station to PROFIBUS-DP and is also used to acquire digital signals.

Features

- Connection to PROFIBUS-DP using M12 connectors (B-encoded)
- Opens the Fieldline modular local bus using M12 connectors (B-encoded)
- Connection of digital sensors using M12 connectors
- Flexible voltage supply concept
- LED diagnostic and status indicators for bus operation and voltage supply
- Short-circuit and overload protection of the sensor supply
- IP65/IP67 protection
- Channel-specific diagnostics for different I/O devices
- Dynamic configuration and empty spaces

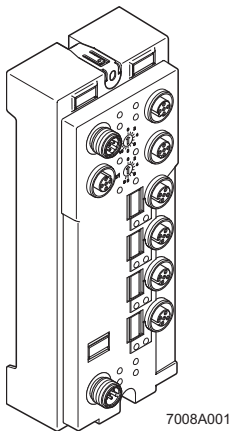

Figure 1 FLM BK PB M12 DI 8 M12

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This data sheet is only valid in association with the FLS FLM SYS INST UM E (Order No. 26 98 97 3) and FLS FLM PB SYS PRO UM E (Order No. 26 99 07 9) user manuals.

Make sure you always use the latest documentation.
It can be downloaded at www.download.phoenixcontact.com.

A conversion table is available on the Internet at
www.download.phoenixcontact.com/general/7000_en_00.pdf.

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Pin Assignment

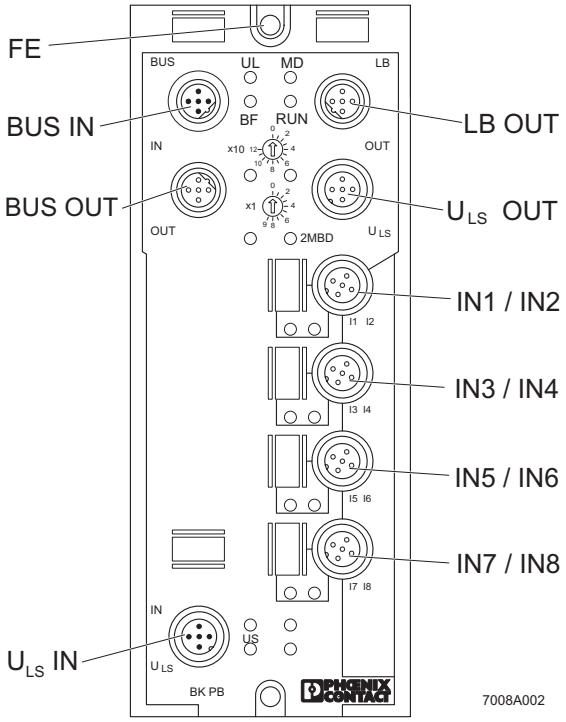

Figure 2 Connections of the FLM BK PB M12 DI 8 M12

Des.	Meaning
FE	Functional earth ground
BUS IN	PROFIBUS IN
BUS OUT	PROFIBUS OUT
LB OUT	Local bus OUT (FLM local bus)
U_{LS} IN	Power supply IN (logic and sensor supply)
U_{LS} OUT	Voltage supply OUT (logic and sensor supply) for additional devices
IN1 to IN8	Inputs 1 to 8

In general, the maximum current load of 4 A per contact must not be exceeded.

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Pin Assignment PROFIBUS

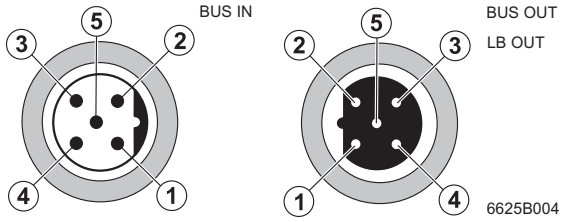

Figure 3 PROFIBUS pin assignment (M12 B-encoded)

Pin	BUS IN	BUS OUT
1	VP	VP
2	RxD/TxD-N (A)	RxD/TxD-N (A)
3	DGND	DGND
4	RxD/TxD-P (B)	RxD/TxD-P (B)
5	Shield	Shield

The shield is connected to FE in the device.

Local Bus Pin Assignment (LB OUT)

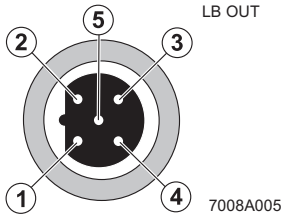

Figure 4 Local bus pin assignment (LB OUT)

Pin	LB OUT
1	DO
2	$\overline{DO}$
3	DI
4	$\overline{DI}$
5	GND

The thread is used for shielding.

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Pin Assignment of the Voltage Supply U_{LS}

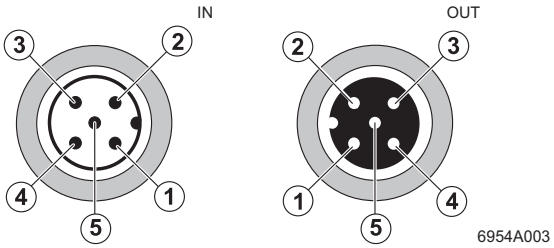

Figure 5 Pin assignment of the voltage supply U_{LS}

Pin	IN	OUT
1	U_L +24 V	U_L +24 V
2	U_S GND	U_S GND
3	U_L GND	U_L GND
4	U_S +24 V	U_S +24 V
5	500 kbaud / 2 Mbaud	500 kbaud / 2 Mbaud

You can change the transmission speed on the local bus from 500 kBaud to 2 MBaud. The transmission speed is switched to 2 Mbaud by jumpering +24 V (U_L, Pin 1) to Pin 5.

Voltages U_L and U_S at female connector U_{LS} OUT can each only carry a maximum current of 2 A.

Pin Assignment of the Inputs

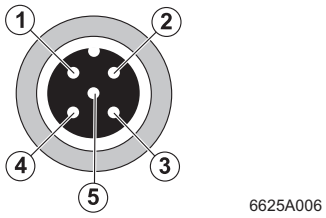

Figure 6 Pin assignment of the inputs

Pin	Input Socket (INx/INx+1)
1	U_S +24 V
2	Input x+1
3	GND
4	Input x
5	FE

Assignment of the Input Sockets

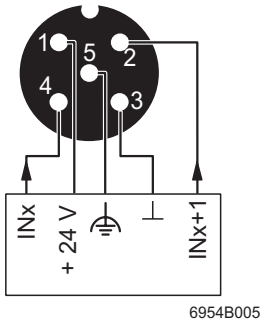

Figure 7 Assignment of the input sockets

Two input signals can be connected to each input socket.

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Local Diagnostic and Status Indicators

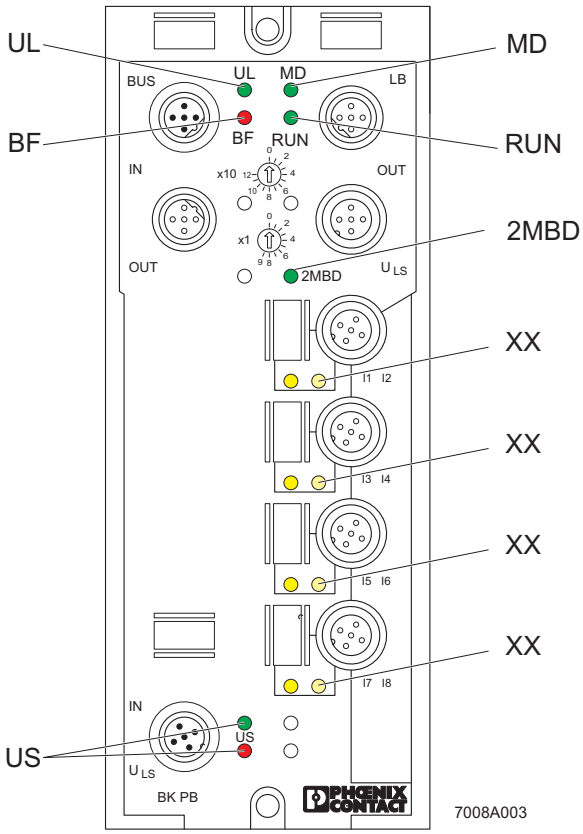

Figure 8 Diagnostic and status indicators of the FLM BK PB M12 DI 8 M12

Rotary Encoding Switches

Set the station address using both rotary encoding switches X10 (for the first digit of a two-digit number) and X1 (for the second digit of a two-digit number). The PROFIBUS master addresses the device by means of this station address.

The valid value range is between 1 and 126.

A new address value is only accepted upon device power up.

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Des.	Color	Meaning
UL	Green LED	Communications power
	ON:	Communications power present.
	OFF:	Communications power too low.
BF	Red LED	No cyclic data transmission: – PROFIBUS not connected, master not active – Incorrect settings (configuration via master, station address) Timeout expired
	LED OFF:	Device addressed by PROFIBUS;a parameterization was received No power supply for the device (In this state the "UL" LED also is off because of the missing 24 V communications power.)
MD	LED green/red/ yellow	Device status
	Green ON:	Device ready to operate
	Green, flashing: 1 Hz	A recoverable error is present (local bus not complete). Station in process data mode.
	Green/red Flashing (flicker)	Device in selftest state.
	Red ON	An irrecoverable error is present.
	Red flashing: 1 Hz	Local bus is read, no process data transmission on local bus.
	Yellow flashing: 1 Hz	More than 64 devices configured or system restriction of 244 bytes of process data/configuration data exceeded.
	OFF:	Voltage not present.
RUN	LED green/red/ yellow	Status of local bus communication
	Green ON	Local bus is running data cycles.
	Green, flashing: 1 Hz	I/O error present.
	Red ON	Local bus stopped.
	Red/yellow Flashing: 1 Hz	There are differences between specified and current configuration.
	Green/yellow Flashing: 1 Hz	Preprogrammed error values are written to the outputs. PLC stopped or PROFIBUS connection interrupted (cable, connector).
	Yellow flashing: 1 Hz	PCP error on a local bus device
	OFF:	Voltage not present.
US	Green/red LED	Voltage supply for inputs IN1 to IN8
	Green ON:	Voltage supply present.
	Red ON:	Overload or voltage supply too low.
	OFF:	Voltage supply not present.

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Internal Circuit Diagram

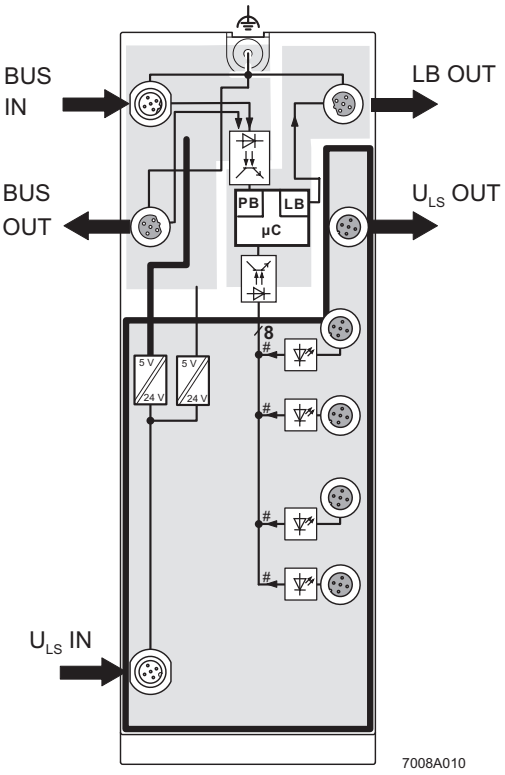
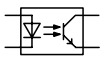


Figure 9 Internal wiring of the connection points

Key:

Functional earth ground


Optocoupler

Protocol chip

Local bus/protocol unit

Power supply unit with electrical isolation

Input

LED

Electrically isolated area

For information on electrically isolated areas, please refer to page 12.

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Connection Example

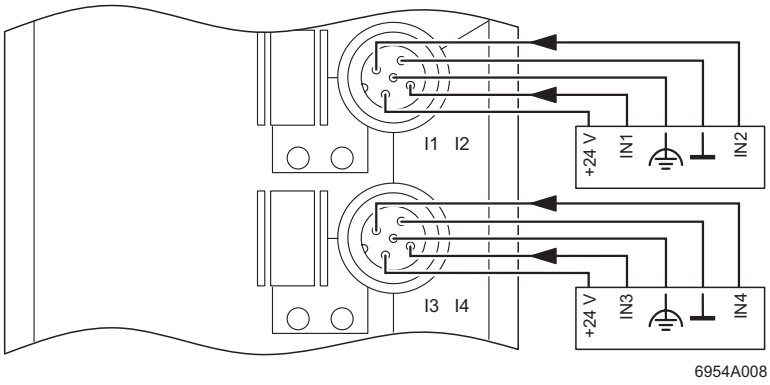

Figure 10 Typical sensor connections

Connection Notes

Meet noise immunity requirements

Connect FE using a mounting screw or a cable connection to the FE connection latch (when mounting on a non-conductive surface).

Ensure degree of protection

To ensure IP65/IP67 protection, cover unused sockets with protective caps.

Avoid damage to the electronics

Make sure you only supply the sensors with the voltage U_S provided at the connection points.

Avoid polarity reversal

Avoid polarity reversal of the supply voltages U_L and U_S in order to prevent damage to the device.

Observe connection point assignment

When connecting the sensors, observe the assignment of the connection points to the PROFIBUS IN process data (see "Process Data" on page 9).

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Configuration Data

ID number	07E9
Input address area	8 bits

Process Data

Assignment of the Connection Points to the IN Process Data

(Byte.bit) view	Byte	Byte 0							
	Bit	7	6	5	4	3	2	1	0
Device	Input	8	7	6	5	4	3	2	1

Diagnostic Data

Mapping of the Diagnostic Data in PROFIBUS

Diagnostic Data	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0	Remark
Byte 0	X	X	X	X	X	X	X	X	Station status 1
Byte 1	X	X	X	X	X	X	X	X	Station status 2
Byte 2	X	X	X	X	X	X	X	X	Station status 3
Byte 3	X	X	X	X	X	X	X	X	Master address diagnostics
Byte 4	0	0	0	0	0	1	1	1	High ID number
Byte 5	1	1	1	0	1	0	0	1	Low ID number

Bytes 0 to 5 are PROFIBUS standard. Bytes 6 to 78 are device-specific. For information on device-specific bytes, please refer to the FLS FLM PB SYS PRO UM E user manual, Order No. 26 99 07 9.

If a diagnostic event occurs the diagnostic data is always sent to the master by means of a diagnostic telegram generated once by the device. The current status of the diagnostic data can be read by the device at any time.

For further information on the diagnostic data please refer to the FLS FLM PB SYS PRO UM E user manual, Order No. 26 99 07 9.

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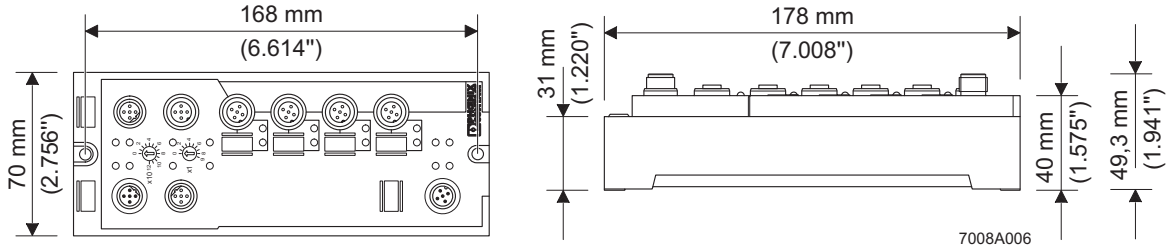
Technical Data

Device Dimensions



General Data	
Order Designation	FLM BK PB M12 DI 8 M12
Order No.	27 36 33 0
Housing dimensions (width x height x depth)	70 mm x 178 mm x 49.3 mm
Weight	285 g, approximately
Type of sensor connection	2, 3 or 4-wire technology
Permissible temperature (operation)	-25°C to +60°C
Permissible temperature (storage/transport)	-25°C to +85°C
Permissible humidity (storage/transport)	95%

For a short period, slight condensation may appear on the housing.

Permissible air pressure (operation)	80 kPa to 106 kPa (up to 2,000 m above sea level)
Permissible air pressure (storage/transport)	70 kPa to 106 kPa (up to 3,000 m above sea level)
Degree of protection	IP65/IP67 according to IEC 60529
Class of protection	Class 3 according to VDE 0106, IEC 60536

Mechanical Requirements	
Vibration test Sinusoidal vibrations according to EN 60068-2-6	5g load in each space direction
Shock test according to EN 60068-2-27	30g load, half sinusoidal wave positive and negative in each space direction

For additional information on mechanical requirements and ambient conditions, please contact Phoenix Contact.

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Voltage Supply	
Nominal value	24 V DC
Range	18 V DC to 30 V DC, ripple included
Current consumption at U_L at 24 V DC	
At 500 kbaud	75 mA, typical (100 mA, maximum)
At 2 Mbaud	75 mA, typical (100 mA, maximum)
Current consumption at U_S at 24 V DC	15 mA + sensor current, typical (600 mA, maximum)

Voltages U_L and U_S at female connector U_{LS} OUT can each only carry a maximum current of 2 A.

Digital Inputs	
Number	8
Nominal input voltage	24 V DC
Range	-30 V DC < U_{IN} < + 30 V DC
Nominal input current	5 mA
Current flow	Linear in the range 1 V < U_{IN} < 30 V
Delay time	t_{ON} = 2.9 ms, typical t_{OFF} = 2.6 ms, typical
Permissible cable length to the sensor	< 30 m

Input Characteristic Curve

Input Voltage (V)	Typical Input Current (mA)
-30 < U_{IN} < 0.7	0
3	0.5
6	1.0
9	1.5
12	2.2
15	3.0
18	3.6
21	4.4
24	5.1
27	5.8
30	6.6

Sensor Supply	
Minimum sensor voltage	U_S -1 V
Nominal current per channel	600 mA
Nominal current per device	600 mA
Overload protection	Electronic per device
Short-circuit protection	Electronic per device

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Error Messages to the Higher-Level Control or Computer System	
Sensor supply short-circuit	Yes
Sensor supply overload	Yes

If an error is triggered by an overload or short circuit of the sensor supply, the device switches off the sensor supply of the channels and updates the diagnostics. The corresponding error message can then be read out by the master. If the sensor supply U_S is not sufficiently high, the master can read out an appropriate error message also.

Interface	
Bus system	PROFIBUS DP
Incoming Bus	
Coupling of shield connection	Directly to FE
Transmission Speed	12 Mbaud, maximum
Outgoing Bus	
Coupling of shield connection	Directly to FE
Transmission Speed	12 Mbaud, maximum

For transmission rates of more than 3 MBaud in PROFIBUS, series inductance is available in the device. Please observe the installation instructions of the PROFIBUS User Organization.

Electrical Isolation/Isolation of the Voltage Areas

For device connection, please note the instructions and regulations in the "Installing the Fieldline Product Range" user manual FLS FLM SYS INST UM E (Order No. 26 98 97 3).

Separate Potentials in the FLM BK PB M12 DI 8 M12	
- Test Distance	**- Test Voltage**
24 V supply (bus logic) / FE	500 V AC, 50 Hz, 1 min
24 V supply (bus logic) / digital inputs (sensor supply/I/O)	500 V AC, 50 Hz, 1 min
24 V supply (bus logic)/incoming remote bus	500 V AC, 50 Hz, 1 min
Digital inputs (sensor supply/I/O) / FE	500 V AC, 50 Hz, 1 min
Digital inputs (sensor supply / I/O)/ incoming remote bus	500 V AC, 50 Hz, 1 min
Incoming remote bus / FE	500 V AC, 50 Hz, 1 min

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Ordering Data

Ordering Data Device and Accessories

Description	Order Designation	Order No.	Pcs./Pkt.
Fieldline Modular Bus Coupler for PROFIBUS With 8 Digital Inputs	FLM BK PB M12 DI 8 M12	27 36 33 0	1
Protective caps (for unused sockets)	IBS IP PROT-IO	27 59 91 9	5
Protective caps (for unused male connectors)	PROT-M12-M	27 36 19 4	5
5-pos. shielded metal socket, B-encoded, for the incoming local bus	SACC-M12FSB-5SC SH	15 13 59 6	1
Shielded metal connector, 5-pos., B-encoded, for the outgoing remote bus and local bus	SACC-M12MSB-5SC SH	15 13 57 0	1
Markers	ZBF 12:UNBEDRUCKT	08 09 73 5	10
Bridging cable for power supply, A-encoded, 5-pos., unshielded	SAC-5P-MS/ 0,13-186/FS SCO	15 18 48 1	1
Bridging cable for the local bus, B-encoded, 5-pos., shielded	SAC-5P-MSB/0,13-PUR/FSB SCO SH	15 18 47 8	1
Assembly system for 5 devices	FLM MP 5	27 36 66 0	1
Assembly system for 7 devices	FLM MP 7	27 36 67 3	1

Additional accessories for connecting the sensors and actuators can be found in the Phoenix Contact PLUSCON catalog.

Ordering Data for Documentation

Description	Order Designation	Order No.	Pcs./Pkt.
"Installing the Fieldline Product Range" user manual	FLS FLM SYS INST UM E	26 98 97 3	1
"Configuring a PROFIBUS DP System Using Devices in the Fieldline Product Range" user manual	FLS FLM PB SYS PRO UM E	26 99 07 9	1

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